1856MNRAS..17....7D

"The drawing of the 12th October was made in an ellipse set out previously from the data given in the *Nautical Almanac* to the scale adopted in all my previous drawings, namely, 0·125 inch to the second of arc; the dimensions and positions of the belts being eye observations. The figure was, however, so obviously too flattened an ellipse, that I was induced to measure the planet, and obtained a complete confirmation of my suspicion; on all other occasions I have made measurements not only of the planet, but also of his belts before commencing a drawing. I subjoin the results in so far as they relate to the polar and equatoreal dimensions of the planet, reserving the full details for another communication. I have reduced the observations also to the mean distance 5·20279, adopted by Mr. Main in his valuable paper 'On the Diameters of Planets having Measurable Disks.' The inclination of the belts was found to be:—

Oct. 12 ...... 23° 25′
" 30 ...... 26 34

Date of Observation.	Observed		Reduced		Deduced Ellipticity neglecting the Slight Correction for Phase.*
	Equatoreal Diameter.	Polar Diameter.	Equatoreal Diameter.	Polar Diameter.	
1856.	Means of Eight Measures. ″	Means of Eight Measures. ″	″	″	
Oct. 25	47·500	44·800	37·247	35·131	0·05681
27	47·080	44·720	37·075	35·217	0·05011
30	46·793	44·267	37·100	35·090	0·05418
			37·141	35·146	$0{\cdot}05370 = \frac{1}{18{\cdot}62}$

Telescopic Appearances of the Planet Saturn during the Apparition of 1855–6, *as observed with an 8-inch Object-glass.* By the Rev. W. R. Dawes.

This communication will be published *in extenso* in another form. In commencing, Mr. Dawes states that "the object-glass, with which the following observations were made, is the work of Mr. Alvan Clark, of Boston, U.S., the same excellent maker who furnished me with the $7\frac{1}{2}$-inch glass, with which I observed the previous year. Its focal length is 10 feet;—rather too great for convenience in my dome, which was constructed for an $8\frac{1}{2}$-foot telescope: and the artist is therefore only waiting for unexceptionable materials wherewith to construct an object-glass of

---

* Mr. Main remarks that, if the *Correction for Phase* were allowed for, the resulting ellipticity would be nearly identical with his own determination.

1856MNRAS..17....7D

the same aperture, with a considerable diminution of focal length The present 8-inch is a remarkably clear and sharp definer; and has afforded me some of the finest views of *Saturn* which I have ever enjoyed. Under suitable circumstances, it shows a minute but clear separation between the components of γ^2 *Andromedæ*."

The observations that follow are extracts from the entries in his observatory journal made at the time of observation.

Outer Ring, distinguished by Mr. Dawes as A. The pencil line on the outer ring was observed on Dec. 15 and Dec. 18, 1855, and on Feb. 15, 1856.

Middle Ring B. The dark band near the inner edge of the middle ring was seen distinctly defined on many occasions; and Mr. Dawes thinks that the bright line close to its inner edge is broader and less bright than on former occasions. Mr. Dawes notices an appearance of indistinctness on a part of the inner edge of the middle ring, which seems to confirm the opinion already placed on record by Mr. De la Rue, respecting the overlapping of the dusky ring on the middle ring.

"The inner edge of B is remarkably less distinct on the eastern side than on the western. I cannot account for this.

"1855, Dec. 19. Mr. F. Barrow visited the Observatory, and saw *Saturn*. . . . Without any intimation from me, he noticed the less defined appearance of the inner edge of the ring B on the south-following (or south-eastern) side; and suggested that it might be owing to the plane of the obscure ring C being inclined to that of the bright rings. This strikingly confirms my observation of last night.

"1855, Dec. 20. The same difference in the distinctness of definition of the inner edge of B on the eastern side and on the western is noticed, as I have before recorded."

Obscure Ring C. Mr. Dawes notices differences in the tint of different portions of the dusky ring, and that its light fades off towards its inner edge. He also, on one occasion, Nov. 15, 1855, made out a black line between it and the inner edge of the middle ring; but on the preceding side only.

The Ball. Mr. Dawes has paid particular attention to the markings on the disk of the planet, and also on the extent to which its southern limb covered the principal division between the outer and middle rings; the following observations relating to the period of the greatest opening of the rings are of interest.

"1855, Dec. 15. I cannot be sure that any part of the division is visible at the southern point of the ball, which I believe entirely covers it.

"1856, Jan. 29. I think the whole breadth of the division between A and B is not entirely covered by the ball, though I believe the greater part of it is so. . . . No very distinct belts on the ball. The polar belt appears to be less dark than it was during the earlier part of this apparition; and so is the narrow belt at about 40° south latitude.

"1856, Feb. 15. The southern edge of the ball does not cover more than from one-half to two-thirds of the division between A and B.

"1856, Feb. 16. The southern edge covers, I think, rather more than half the breadth of the division . . . . The narrow belt, at about 45° or 50° of south latitude, is at times well brought out.

"1856, March 24. The ball appears to me to cover a small portion of the breadth of the division; but the air is scarcely favourable enough to determine it.

"1856, March 28. I cannot feel certain of the continuation of the division beyond the southern edge of the ball.

"1856, April 4. Very careful scrutiny leaves no doubt on my mind that the division between A and B is partly covered by the southern edge of the ball. When vision is finest, an extremely narrow dark line, like a hair, is seen to extend across the top or southern point of the ball; beyond which it is soon lost in the shadow of the ball."

Shadow of the Ball. The observations of the shadow of the ball on the rings extend from Nov. 15th, 1855, to April 4th, 1856.

On March 24, 1856, he remarks:—"The shadow of the ball certainly falls on A. The exterior edge of the shadow on B has a pretty regular though slight convexity, and is not *recurved* at the exterior edge of B, where the shadow of the ball joins the division between A and B."

The paper also contains several observations of *Enceladus.*

In conclusion he remarks:—"In No. 1017 of the *Astron. Nachr.*, Professor Secchi has given a brief account of the admirable performance of the large refractor by Merz, at the Observatory of the Collegio Romano; in which is the following remark respecting the position of the southern edge of the ball of *Saturn* on 1855, Dec. 16. 'The vertex of the globe scarcely touched the edge of the ring A.'

"It seems, therefore, that at that time Professor Secchi's impression almost perfectly coincided with my own.

"I ought, perhaps, here to offer a word or two in explanation of an expression which I employed when referring to this point in my paper printed in the *Monthly Notices* for 1855, Jan. 12, and in No. 971 of the *Astron. Nachr.* When I there spoke of 'a change to a considerable, and, in fact, *unaccountable*, amount having taken place,' if certain observations were correct, I intended simply to say, that there was *no well-known or recognised cause*, which was sufficient to account for it:—the variation which had occurred in the obliquity of the plane of the ring being obviously insufficient. Several causes, *more or less probable*, might be assigned for it, as Professor Secchi has shown in his remarks on my expression; but to such I was not referring when I used it.

"*Haddenham, near Thame,*
October, 1856."